

REMARKS

Upon entry of this Amendment, claims 1, 3, 4, 6-11, and 21-23 remain pending and under current examination. In the Office Action,¹ the Examiner:

- a) rejected claims 1, 4, 6, and 7 under 35 U.S.C. § 102(b) as being anticipated by Nakajima et al. (U.S. Patent No. 5,907,188, “Nakajima”); and
- b) rejected claims 3, 8-11, and 21-23 under 35 U.S.C. § 103(a) as being unpatentable over Nakajima in view of Hu (U.S. Patent No. 5,962,904, “Hu”).

By this amendment, Applicants have amended claims 1 and 4 to more appropriately define the invention. Claims 1, 3, 4, 6-11, and 21-23 are pending and under current examination.

Applicants have amended claim 1 to recite, in part, “forming a first insulating film selected from a silicon oxide film, a silicon nitride film, and a silicon oxynitride film on a semiconductor substrate.” Support for the changes may be found in the Specification at, for example, page 29, lines 3-18.

Applicants traverse the rejection of claims 1, 4, 6, and 7 under 35 U.S.C. § 102(b) as being anticipated by Nakajima. Applicants respectfully disagree with the Examiner’s arguments and conclusions.

In order to properly establish anticipation under 35 U.S.C. § 102, the Federal Circuit has held that “[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2

¹ The Office Action may contain statements characterizing the related art, case law, and claims. Regardless of whether any such statements are specifically identified herein, Applicants decline to automatically subscribe to any statements in the Office Action.

USPQ2d 1051, 1053 (Fed. Cir. 1987). Furthermore, “[t]he identical invention must be shown in as complete detail as is contained in the ... claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1126, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). See also M.P.E.P. § 2131.

Nakajima does not anticipate Applicant’s independent claim 1, for at least the reason that Nakajima fails to disclose the claimed “forming a first insulating film,” and “forming a second insulating film comprising a metal oxide film or a metal silicate film by oxidizing said metal compound film,” as recited in claim 1. Nakajima teaches, in Figs. 1A and 1B, a tungsten nitride film 2 and a tungsten film 3 deposited on a silicon substrate 1, and an oxide film 4 formed between the silicon substrate 1 and the tungsten nitride film 2 by an oxidation process. See Nakajima, col. 9, lines 32-43.

The Examiner contends that “Nakajima describes...forming a metal-containing insulating film...by oxidizing said metal compound film (4).” Final Office Action at pages 2-3. However, Nakajima does not teach “forming a first insulating film” and “forming a second insulating film by oxidizing [a] metal compound film,” as recited in claim 1. In particular, although Nakajima teaches a silicon oxide film 11 formed on a single crystal silicon substrate 10, as illustrated in Figs. 3A and 3B, the structure of Nakajima does not disclose forming a **second** insulating film by oxidizing a metal compound film. Moreover, Nakajima discloses that oxide film 4 in Fig. 1B is formed by **oxidation of silicon substrate 1**, as described in col. 9, lines 38-42. Therefore, Nakajima cannot disclose the claimed “forming a second insulating film comprising a metal oxide film or a metal silicate film by oxidizing said metal compound film,” as recited in amended claim 1.

Since Nakajima does not disclose each and every element of claim 11, Nakajima cannot anticipate Applicants' claim 1 under 35 U.S.C. § 102(b). Accordingly, claim 1 is allowable over Nakajima at least for this reason, and claims 4, 6, and 7 are also allowable at least due to their dependence from claim 1. Thus, the 35 U.S.C. § 102(b) rejection of claims 1, 4, 6, and 7 should be withdrawn.

Applicants traverse the rejection of claims 3, 8-11, and 21-23 under 35 U.S.C. § 103(a) as being unpatentable over Nakajima in view of Hu. A *prima facie* case of obviousness has not been established.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). M.P.E.P. § 2142, 8th Ed., Rev. 5 (August 2005), p. 2100-125.

Regarding claim 3, claim 3 depends from claim 1, and thus requires each and every element recited in claim 1. A *prima facie* case of obviousness has not been established because, among other things, Nakajima and Hu, taken alone or in combination, fail to teach or suggest each and every element recited in claim 1 and required by dependent claim 3.

As discussed above in regard to the Examiner's § 102(b) rejection of claim 1, Nakajima fails to teach or suggest the claimed "forming a second insulating film comprising a metal oxide film or a metal silicate film by oxidizing said metal compound film." The Examiner relies on Hu for allegedly teaching a metal compound film having a

thickness not larger than 5 nm. However, even if Hu provides such teachings, Hu is entirely silent as to any teachings of a second insulating film by oxidizing a metal compound film, and thus fails to overcome the shortcomings of Nakajima discussed above in regard to amended claim 1. Accordingly, no *prima facie* case of obviousness has been established regarding claim 3. Claim 3 is thus allowable over the Examiner's proposed combination of Nakajima and Hu, at least due to its dependence from allowable claim 1.

Regarding independent claim 8, Applicants note that Nakajima does not teach the claimed "plurality of first insulating regions formed of grains containing a metal oxide of a metal element contained in said metal compound film and a second insulating region formed of an amorphous insulating material, and each of said first insulating regions is formed in said second insulating region," as recited in claim 8. The Examiner alleges that Hu teaches "said metal-containing insulating film consists of a plurality of first insulating regions formed of [grains] containing a metal oxide of a metal element contained in said metal compound film [and] a second insulating region formed of an amorphous insulating material in a region (Hu layer 14-crystalline) and except the first insulating regions (Hu layer 18 amorphous)." Final Office Action at page 5. Further, the Examiner alleges that "Hu col. 4 lines 5-11 [teaches] wherein the layer comprises both tungsten silicon nitride and titanium nitride similar to Applicants' specification paras 0252 and 0266, also shown in Figs. 7[A] and 8B wherein insulating film has [insulating] regions 71/72 or both and layer 14-crystalline and layer 18 amorphous, Nakajima 3-tungsten, 4-oxide." Final Office Action at page 8. The Examiner apparently alleges that the disclosure of Hu, in particular, the gate oxide layer 14 and the diffusion barrier

layer 18, as illustrated in Fig. 1 of Hu, teach the claimed “first insulating regions” and “second insulating region.” However, this is not correct.

Hu teaches, in Fig. 1, a device structure including a gate oxide layer 14 and a diffusion barrier 18. Hu also describes that the diffusion barrier 18, comprised of a refractory metal silicon nitride, is amorphous. See Hu, col. 5, lines 7-9. However, as clearly seen in Fig. 1, the gate oxide layer 14 is **not formed in** the diffusion barrier 18. Rather, the gate oxide layer 14 and the diffusion barrier 18 are separated by a silicon-containing material 16. Therefore, the gate oxide layer 14 and the diffusion barrier 18 in Fig. 1 of Hu cannot teach or suggest “each of said first insulating regions [being] formed in said second insulating region,” as required by claim 8.

Accordingly, Hu fails to teach or suggest the claimed “a plurality of first insulating regions formed of grains containing a metal oxide of a metal element contained in said metal compound film and a second insulating region formed of an amorphous insulating material, and each of said first insulating regions is formed in said second insulating region,” as recited in claim 8. Hu thus fails to overcome the above-noted deficiencies of Nakajima. Therefore, no *prima facie* case of obviousness has been established. Claim 8 is therefore allowable over the Examiner’s proposed combination of Nakajima and Hu, and claims 9-11 and 21-23 are allowable due to their dependence from claim 8. Thus, the 35 U.S.C. § 103(a) rejection of claims 3, 8-11, and 21-23 should be withdrawn.

In view of the foregoing, Applicants request reconsideration of the application and withdrawal of the rejections. Pending claims 1, 3, 4, 6-11, and 21-23 are in condition for allowance, and Applicants request a favorable action.

Please grant any extensions of time required to enter this response and charge
any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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